3.7 Resource Planning Activities

3.7.1 Resource Planning Scenario

The following scenario discusses planning for the use of system resources. Some preliminary discussion of resource planning is useful to set the context for this scenario.

A resource plan describes how hardware resources are allocated to the major ECS data processing services and to other activities. These other activities include maintenance, test, etc. and are sometimes referred to as ground events. Hardware resources are platforms, (sub)networks, storage devices. A platform consists of a list of CPUs and disks. The major ECS services (ingest, production, etc.) have specific, pre-defined names. When indicating that a resource is allocated to an ECS service or activity, one of these names will be used.

The list of possible hardware resources in the ECS system is maintained under configuration control in the MSS Configuration Management (CM) System. This CM resource list contains the approved usage for each resource. The hardware resources that will be scheduled for use are copied from and retained and scheduled by the resource planning system. Also future hardware configuration changes may be defined in the resource planning system before entry into the CM system.

The planning/allocation of the resources to services and activities is the responsibility of the Resource Planner (operations staff). The Resource Planner determines the allocation using resource requests submitted by the various parties who have needs for DAAC resources, e.g., for training, test or routine production.

A principal of operation underlying the planning of resources is that resources are routinely allocated to specific system services. For example, the processors that are used for production processing are normally allocated to that purpose on a long term basis. It is on an exception basis that they are allocated to other activities.

Prioritization of ground events will be accomplished by operations and management. For Release A, cross site planning and coordination will be a procedural activity supported by the publication of plans.

3.7.1.1 Scenario Description

The following scenario is assumed to occur during a given day of the Release A period at the LaRC DAAC. The system at the DAAC is in stable operations. The scenario describes the process for entry of ground events into the resource planning system by the resource planner. Several resource requests are forwarded to the resource planner, including three unrelated maintenance activities against three different hardware resources:

- A software upgrade for a LAN router—due during the next week
- A hardware maintenance activity against a production processor—due in 3 weeks
- A hardware maintenance activity against a archive storage device—due in 6 weeks

The start times of maintenance activities are usually selected to suit the needs of the persons required for the activity. Production processing, however, is not a personnel intensive activity and can ordinarily be planned to occur on a routine basis in accordance with data availability and data dependencies. It is assumed that the start times and durations of the maintenance activities are fixed. The resource planner would be able to see that the Ground Event is in conflict with the routine allocation of the processor for production and ask the production planner (operations staff) for a revised resource request, possibly indicating which time frame would minimally impact the production planned for that day.

3.7.1.2 Frequency

Resource planning is expected to be a routine event. The resource planner will develop, review the current status of, or update resource plans every day during the work week. In particular, during transition periods when significant hardware or software upgrades are being installed and tested, operators are being trained, etc., resource planning may be more involved. Also, when new versions of science software are integrated into the ECS from the SCFs, additional production processing resources may be planned for this purpose. A significant amount of the resource planning activity will not involve ECS tools, but rather will involve discussions and coordination with other organizations.

It is estimated that, on average during the Release A period, 5 ground events will be entered or updated per day. The most busy day during this period is expected to see no more than 25 ground events entered into the resource planning tool. Based on these figures and assuming a typical 13 week (3 months) planning horizon, the resource planning system is expected to contain on the order of 455 ground events.

Resource planning is normally begun well in advance of the actual ground event. Those organizations requiring resources for other than the normal operations needs (e.g., test, training, SS I&T) will submit resource requests to the resource manager. Ground events are first entered on to the plan about 3 months before the event. Approximately 2 weeks before the beginning of the month, monthly plans are published for review and coordination. A monthly resource planning meeting is held to review and discuss the monthly plans. Each week at approximately mid-week, plans are generated, published, and distributed for a weekly meeting to review, approve and coordinate for the following week. Finally, a daily resource plan is reviewed at the daily schedule meeting to incorporate any updates and distribute to operations. Ground events can however be recorded in the resource planning system at any time.

The resource planning tool is intended to support the operational activity of planning for, or forecasting of events that require system resources. As a forecasting tool, the resource planning tool will not be useful for 'forecasting' last minute activities. For example, if a device (processor, data server component, etc.) were to fail during a given day, there would be no point to 'planning' the ground event to reflect the device outage and the time required to restore the device to service, unless the time to return the resource to service were to extend into the next day, or unless it was deemed desirable to replan the data production based on the predicted down-time. If an unexpected event were to occur that led to a variance to the on-line resource plan, the resource planner may update the on-line resource schedule when practical.

3.7.1.3 Assumptions

Assumptions underlying this scenario are as follows.

1. The scenario presented here is appropriate to the Release A period.

3.7.1.4 Components

There is one component involved with this scenario, the PLANG CI, which provides the resource planning tool. Figure 3.7.1.4-1 indicates the interaction among the personnel and between the personnel and the PLANG CI.

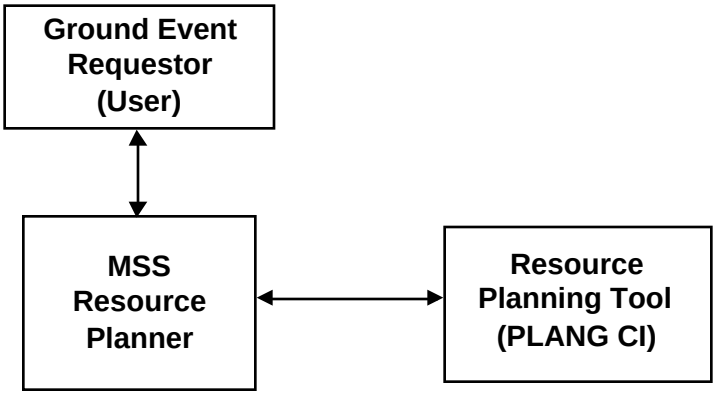

Figure 3.7.1.4-1. Resource Planning Components

3.7.1.5 Preconditions

The following preconditions are assumed for this scenario:

1. The configuration of resources from which resource planning can schedule has been transferred from the MSS configuration management capability to the resource planning subsystem.
2. The resource planning database has been initialized with normal resource allocations and other ground event activities have been entered into the system
3. All necessary technical and management personnel have been involved with the discussions prior to the planning of the ground event.

3.7.1.6 Detailed Steps of Process

Table 3.7.1.6-1 represents the details of the resource planning activity. The time scales indicated are approximate. The User in this case represents DAAC operations person responsible for managing system hardware resources, including the maintenance of those resources. The Operator is the resource planner who is responsible for the planning of utilization of system resources.

Notes to accompany GUIs

These GUIs are preliminary views only and have to be revisited for consistency with human factors guidelines and standards.

Figure 3.7.1.6-5.

The timeline display here was developed as an early prototype, where each ground event is annotated as an outage. The Resource Planning Tool will use the ECS service name, and some user supplied annotation to label each activity.

Table 3.7.1.6-1. Resource Planning Process (1 of 4)

Step	Time	User	Operator	System	Figure
1	> 6 wks prior to event; < 15 minutes duration	The LaRC H/W manager periodically reviews the current status of all equipment to determine the need for maintenance activities for the system resources. She notes that maintenance events are required for one of the two SGI systems in 3 weeks and for an archive storage device in 6 weeks. Each requires less than 3 hrs. Also, a priority software fix for a LAN router is required as soon as possible. The field engineer can be available for the S/W installation early next week. She prefers to schedule such events early in the week. She sends resource requests to the resource planner to have these ground events placed on the plan for Monday morning, 9-12, of the intended weeks.		System delivers resource request to resource planner. The information from the request is entered into the resource planning system automatically.	

2	Shortly after the H/W Manage sends the resource request entry < 1 minute to start up, initialize.		The resource planner starts the resource planning tool.	A GUI for resource planning is provided (See Figure 3.7.1.6-1). The planner accesses this GUI from the basic operations interface after verification of his privileges to do so. A summary tabular display is provided of resource requests defined in the resource planning tool. Options available are: - Edit Activity (Enter/Modify/Authorize) - Review Activities - Configure Resources - Create Resource Plan	

Step	Time	User	Operator	System	Figure
3	< 15 min duration		In accordance with procedures, the LaRC resource planner receives resource planning requests from potential users by COB Wednesday. Most requests are in time to be put on the monthly forecast, a few are forecast for the following week. The planner reviews the requests (See Figure 3.7.1.6-2) for completeness, etc. He coordinates with the requester when a clarification is needed. He performs a quick 'eyeball' check of the requests and the current resource plan to see if conflicts can be resolved quickly. The resource planner assigns the resource requests to a local point of contact or sponsor for coordination and validation.	The resource planning system provides a view for the resource requests, containing the same information as the resource request entry form. E-mail used for contact between the resource planner and the point of contact. Baseline resource information is extracted from the MSS CM system. One piece resources adds, configuration changes, etc., or resynchronization with the CM database is accomplished via the Resource Configuration GUI (see Figure 3.7.1.6-3).	
4	Later the same day; < 5 minutes duration		The local point of contact reviews and validates the resource request, coordinating with the originator as required.	The resource planning system provides a view for the resource requests. The same view is provided to the point of contact for validation.	

Step	Time	User	Operator	System	Figure
5	Next day; < 10 minutes duration		The resource planner selects that a resource plan be generated for the site (See Figure 3.7.1.6-4). He enters the start and stop times / dates for the plan.	Refer to the options identified above in item 2. The planning system generates a plan for the resources, allocating resources to ground events and identifying conflicts.	
6	< 1 minutes duration		When authorizing an allocation the planner is notified that conflicts exist. He notes that a previously entered ground event (hardware maintenance) for a data processing resource will conflict with an AI&T resource request. The event is several weeks away.	The planning tool will identify conflicts between ground events. A timeline view of resources (see Figure 3.7.1.6-5) is provided that identifies ground events against resources. Conflicts are identified by a particular color change where the events overlap.	
7	< 10 minutes duration		The planner quickly jumps to the hardware maintenance ground event and reviews the description. He recognizes from this that the event is a short time duration activity that can be resche-duled easily. He contacts the H/W manager and informs her of the conflict and asks if the ground event can be scheduled to earlier in the day when time is free. She concurs.	The operator can switch from the timeline view to a resource request view to learn about the particulars of a ground event.	

Step	Time	User	Operator	System	Figure
8	< 12 minutes duration		The planner modifies the start time of the particular ground event to the agreed upon start time.	The operator modifies the start time fill-ins on the resource request screen, and authorizes the ground event, as described above. The software confirms that no remaining conflicts exist, an email is sent to the originator.	
9		The H/W manager receives e-mail message confirming that the requested ground event additions and the one ground event modification have been made.			

3.7.1.7 Postconditions

At the completion of the above scenario, the planning database contains new and updated entries reflecting the current state of the ground event plans. The DDS contains the published version of the plan.

The new resource plan includes resources allocated to ground events and to production processing. The resources allocated to production processing will be available for use in planning production. For this scenario, see Section 3.12, Production Planning.

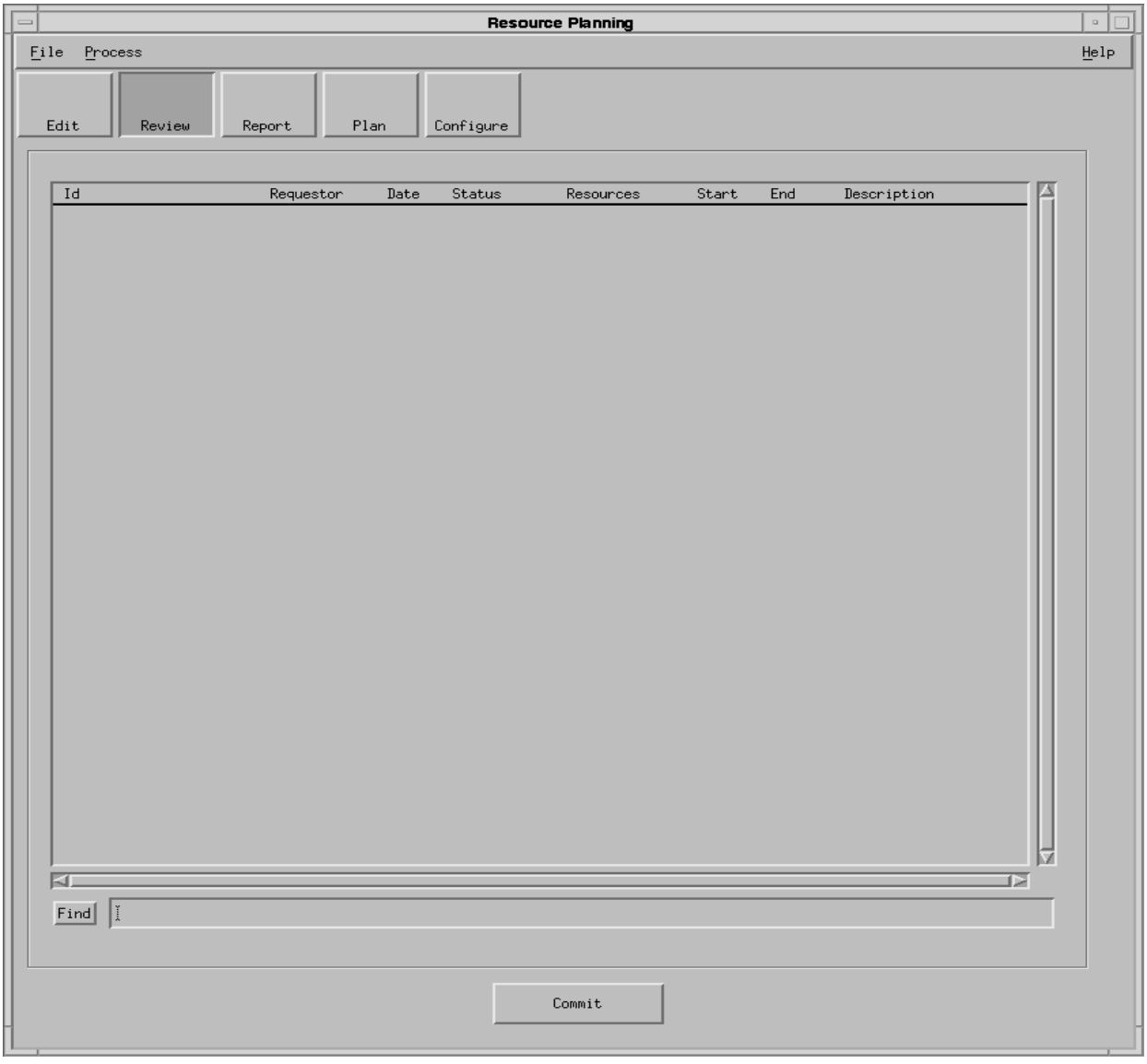

Figure 3.7.1.6-1. Resource Planning - Review

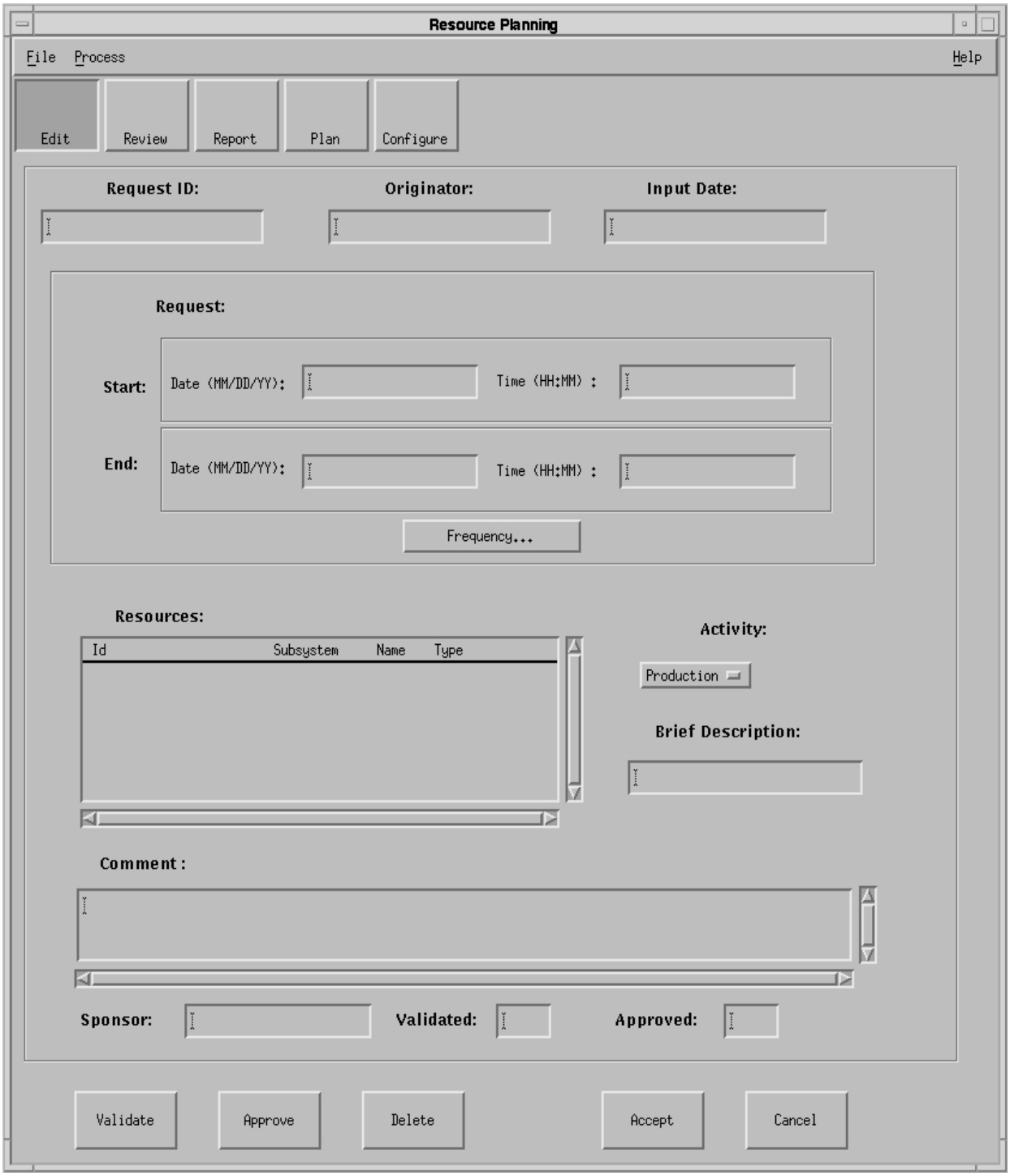

Figure 3.7.1.6-2. Resource Planning - Resource Request

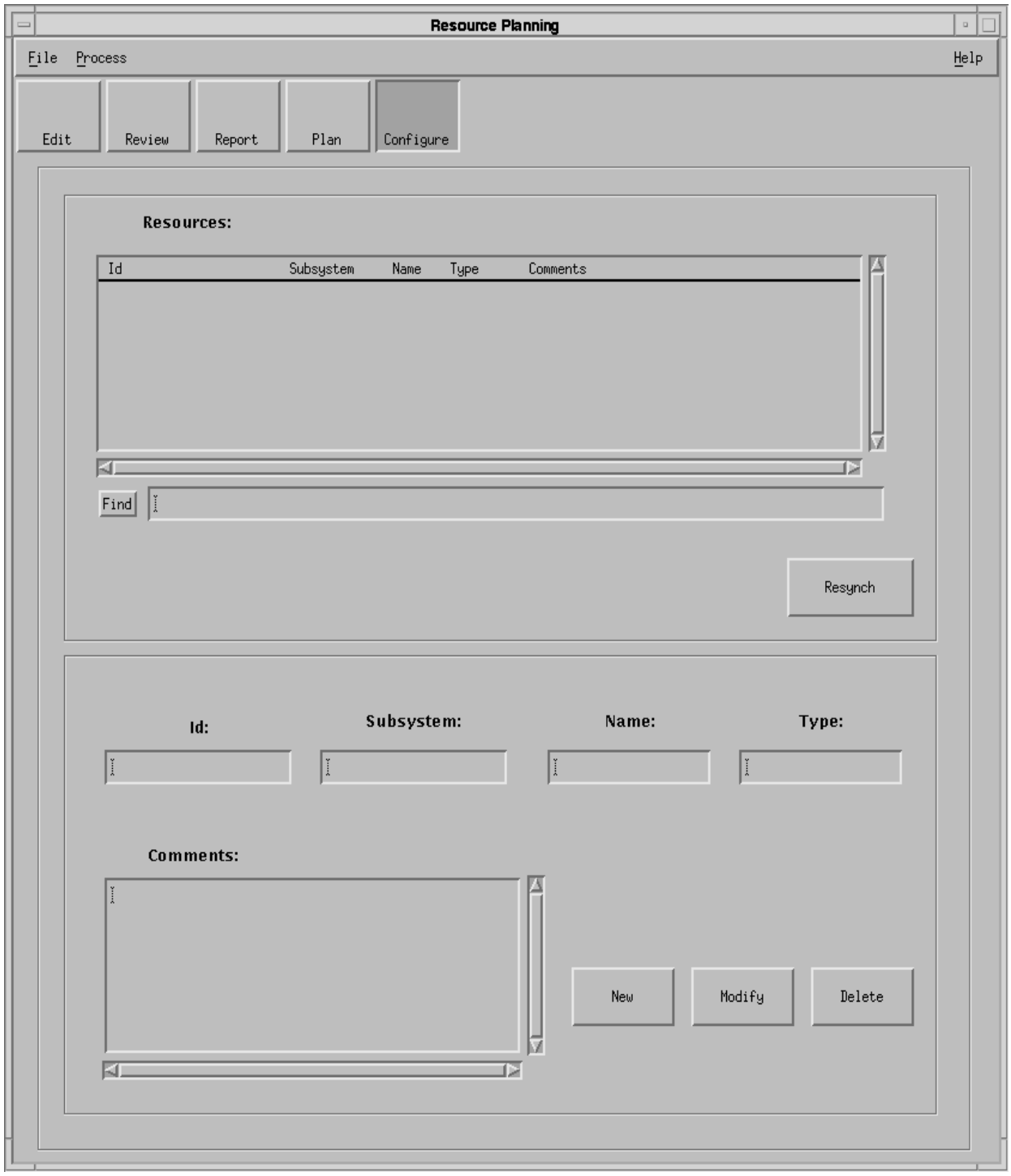

Figure 3.7.1.6-3. Resource Planning - Resource Configuration

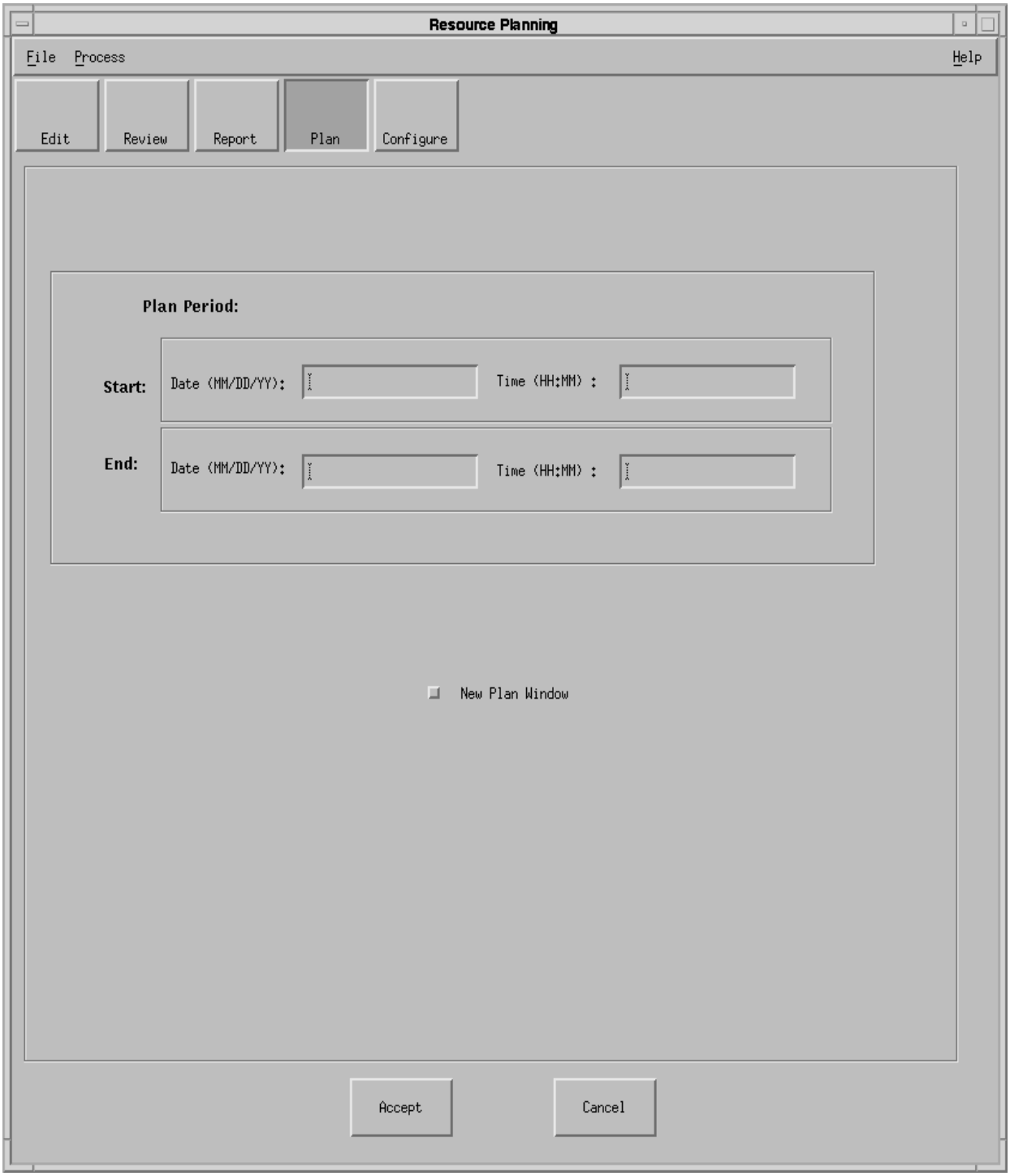

Figure 3.7.1.6-4. Resource Planning - Plan Generation

Figure 3.7.1.6-5. Resource Planning - Timeline View